

What is claimed is:

1. A self-synchronization method for an optical packet network transmitting a packet having a plurality of data pulses, said optical packet network having a node, said method comprising the steps of:

5 generating the packet including the plurality of data pulses, the packet excluding
 a synchronization marker which is optically distinctive from the plurality
 of data pulses;
 transmitting the packet to the node;
 transforming a seed pulse selected from among the plurality of data pulses
10 within the packet to be optically distinguishable from remaining ones of
 the plurality of data pulses;
 discriminating said seed pulse from said remaining ones of the plurality of data
 pulses within the packet; and
 synchronizing an operation of the optical packet network involving the packet at
15 the node using the seed pulse.

2. The self-synchronization method of claim 1 wherein the step of generating the packet and the plurality of data pulses is performed by a laser source and a modulator.

20 3. The self-synchronization method of claim 1 wherein the network is a high-speed, optical packet time-division multiplexed (TDM) network and the operation is performed by a component selected from a group consisting of: a packet router, a header processor, a multiplexer, or a demultiplexer.

25 4. The self-synchronization method of claim 1 wherein prior to the step of transforming the seed pulse selected from among the plurality of data pulses within the packet the method further comprises the step of:
 duplicating the packet to produce a replicate packet.

30 5. The self-synchronization method of claim 4 wherein the steps of transforming and discriminating the seed pulse are performed on the replicate packet.

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6. The self-synchronization method of claim 1 wherein the plurality of data pulses each have an amplitude, and the step of transforming the seed pulse is performed using an amplitude modifier which alters said amplitude of the seed pulse sufficiently compared to said amplitude of the remaining ones of the plurality of data pulses to produce a contrast ratio between said amplitude of the seed pulse and said amplitude of the remaining ones of the plurality of data pulses such that the seed pulse is optically distinguishable from the remaining ones of the plurality of data pulses.

7. The self-synchronization method of claim 6 wherein the amplitude modifier is a fast-saturation, slow-recovery device.

8. The self-synchronization method of claim 6 wherein the contrast ratio is on the order of 3dB or greater.

9. The self-synchronization method of claim 7 wherein the amplitude modifier is a silicon optical amplifier.

10. The self-synchronization method of claim 7 wherein the packet has a first sequential data pulse and the seed pulse is said first sequential data pulse.

11. The self-synchronization method of claim 1 wherein the step of discriminating the seed pulse from the remaining ones of the plurality of data pulses within the packet is performed by an unbalanced non-linear optical loop mirror (NOLM) intensity discriminator.

12. The self-synchronization method of claim 1 wherein the step of discriminating the seed pulse from the remaining ones of the plurality of data pulses within the packet is performed by a self-phase modulation (SPM) optical filter intensity discriminator.

13. A system for self-synchronizing a packet having a plurality of data pulses transmitted via an optical packet network, said packet excluding a synchronization marker which is optically distinctive compared to said plurality of data pulses when

transmitted, said optical packet network including a routing node, said system comprising:

a signal modifier operatively connected to the routing node receiving the packet via the optical packet network, the signal modifier being capable of transforming a seed pulse selected from among the plurality of data pulses within the packet so as to be optically distinguishable from remaining ones of the plurality of data pulses based upon a contrast ratio; and

a discriminator capable of distinguishing said seed pulse from said remaining ones of the plurality of data pulses based upon said contrast ratio.

14. The system of claim 13 wherein the signal modifier is a fast-saturation, slow recover intensity modifier.

15. The system of claim 14 wherein the contrast ratio is on the order of 3 dB or greater.

16. The system of claim 13 wherein the signal modifier is an amplifier.

17. The system of claim 16 wherein the amplifier is a semiconductor optical amplifier.

18. The system of claim 13 wherein the discriminator is an unbalanced non-linear optical loop mirror (NOLM) intensity discriminator.

19. The system of claim 13 wherein the discriminator is a self-phase modulation (SPM) optical filter intensity discriminator.

20. In an optical packet time-division multiplexed (TDM) network wherein a packet including a plurality of data pulses is generated and transmitted to a routing without a synchronization marker that is optically distinctive from said plurality of data pulses, the improvement comprising:

transforming a seed pulse selected from among the plurality of data pulses
within the packet to be optically distinguishable from remaining ones of
the plurality of data pulses proximate to the routing node;
discriminating said seed pulse from said remaining ones of the plurality of data
pulses within the packet; and
synchronizing an operation of the optical packet network involving the packet at
the node using the seed pulse.

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